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A THEORY OF MISGOVERNANCE

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Revised Version

A THEORY OF MISGOVERNANCE

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M.I.T

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[1]This paper was inspired by many conversations with Andrei Shleifer. I have also profited from comments by Daron Acemoglu, Andres Almazan, Gary Becker, Doug Bernheim, Christopher Clague, Peter Diamond, Drew Fudenberg, Oliver Hart, Patrick Legros, Eric Maskin, Andrew Newman, Thomas Piketty, Jean Tirole, Jorgen Weibull and seminar participants at Princeton, UBC, The Kennedy School of Government, University of Chicago and Harvard University. Some of these arguments were in the notes that were circulated some time ago as "The Costs and Benefits of Corruption.". This work was carried out when the author was an IPR junior fellow. It was supported by financial assistance from IRIS. However, the views expressed here are strictly the authors own. The author also acknowledges the hospitality of DELTA in Paris where this work was started.

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A Theory of Misgovernance
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This paper studies the determinants of government performance. The paper identifies two specific reasons for apparently poor government performance. The first is the lack of coherent objectives within the government. This is captured in the paper in the form of a conflict between a welfare-maximizing government and its bureaucrats who are interested only in their private revenues. The second is the government's involvement in the allocation of goods and services to those who are unable to pay as much for the goods as they would like to i.e. those who are credit constrained.

In the paper we show that the conflict in objectives is important in understanding why governmental allocation processes usually involve a lot of red-tape. More specifically we demonstrate that the amount of red-tape is higher when there is a conflict of objectives within the government than when the government and its agents share the same objective - be it social welfare maximization or private revenue maximization.

Another result which follows from the model is that a welfare-minded government may not want to provide high-powered incentives to its private revenue-maximizing bureaucrats. The reason is that high-powered incentives tend to get translated in to high levels of red-tape.

We also show that both red-tape and bribery are reduced when the credit-constraint is relaxed and that reduction in inequality reduces red-tape. This, we feel, might explain poor government performance in some of the LDCs since, typically, the capital markets there work poorly and there is a lot of inequality.

The ultimate goal of this exercise is to influence the way we think about misgovernance and to argue that what we expect from particular governments should be sensitive to the various considerations outlined above.

Abstract

This paper studies the determinants of government performance. The paper identifies two specific reasons for apparently poor government performance. The first is the lack of coherent objectives within the government. This is captured in the paper in the form of a conflict between a welfare-maximizing government and its bureaucrats who are interested only in their private revenues. The second is the government's involvement in the allocation of goods and services to those who are unable to pay as much for the goods as they would like to i.e. those who are credit constrained. The paper demonstrates that the amount of red-tape is higher when there is a conflict of objectives within the government than when the government and its agents share the same objective • be it social welfare maximization or private revenue maximization. Another result which follows from the model is that a welfare-minded government may not want to provide high-powered incentives to its private revenue-maximizing bureaucrats. The reason is that high-powered incentives tend to get translated in to high levels of red-tape. We also show that both red-tape and bribery are reduced when the credit-constraint is relaxed and that a reduction in inequality reduces red-tape. This, we feel, might explain poor government performance in some of the LDCs since, typically, the capital markets there work poorly and there is a lot of inequality.

I. INTRODUCTION

1.1 Ingredients of a Theory of Misgovernance

The government usually enters standard (i.e. non-public choice) economic models as a neutral black box which, when the social interest requires it, acts to levy a tax or hand out a subsidy. This characterization of governmentsflies in the face of much evidence from all over the world suggesting that many government bureaucrats are no more interested in social welfare, and no less interested in lining their pockets, than the man in the street and that politicians either do not want to or are not able to control the cupidity of their agents. Bribery is a common-place of interaction with the government in most countries (with important exceptions) and so is red tape • wasteful and apparently pointless bureaucratic procedures.

It is therefore hardly surprising that there has been a move within economics towards models which represent the government as nakedly self-serving and indifferent to social welfare (see for example Brennan and Buchanan (1980), Tullock (1987) and among more recent work, Shleifer-Vishny (1992, 1993)). While prima facie more appealing, these models have their own problems. In particular, it is not clear why such a government should be particularly different from the average private monopolist and while there are certainly red-tape like procedures in private industry[2] and bribery is not unknown, these are not usually considered a major source of social inefficiency. Why then should we be concerned about red- tape and bribery in

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[2] Now there are certainly some red-tape like procedures in private industry. Early purchase rules for airline tickets, stand-by seats on airlines and cruises and mail-in-rebate vouchers are all examples of procedures which waste some of the buyers time. The motivation, no doubt, is to price discriminate better. Most big firms also have elaborate and wasteful rules governing all substantial purchases. These are intended to discourage corruption of the firms employees by the *sellers* and to the extent they work well and discourage even attempts to corrupt, they may appear to be purely wasteful.

government?

The same point can be made in a different way. Three hundred years ago most governments around the world were much more openly self-serving than they are now. Governments did little more than collect taxes and spend the revenue on maintaining the king, his entourage and his army. Yet, or more accurately, because of that, tax collection involved relatively little red-tape; the government only levied those taxes (like customs duties and land taxes) which could be collected with the least bureaucratic cost. In other words, the immense complexity of the modem tax system came with the move away from openly self-serving governments.

This observation applies equally to bribe-taking. People have always got rich by working for the government but it is only recently that it has ceased to be legal to do so.[3] In other words, the phenomenon of bribery results from the government's decision to limit payments from its clients to its agents and this is essentially a modern phenomenon.

Why would a purely self-serving government put limits on the amounts of money that its agents can collect from their clients? It is true that there can be agency problems within very self-serving governments, and whoever runs the government may not want to let the agent keep all of the money the agent collects, but it-is not clear that either of them will be made better off by collecting less from the clients. One possible explanation is that open profit-seeking by bureaucrats is politically less acceptable than secret bribe-taking because it makes it harder to pretend that the government is acting in the social interest. The problem with this view is that it relies on the population being systematically fooled; given that typically everyone will

[3] See for example Scott (1972) on corruption in Stuart England.

have a friend *or* a relative who is actually paying the bribe. this seems highly implausible. Another explanation is that there are some things that governments simply cannot do - despite it being common knowledge that the government is entirely self-serving. This is what in a recent paper, Andrei Shleifer and Robert Vishny have called a 'decency' constraint.[4]

While we agree with the spirit of this constraint, it seems more satisfactory - conditional on assuming this constraint - to go all the way and assume that the government actually cares about social welfare (possibly along with other things). This is the view of the government we take in this paper. More specifically, we model the government as a composite of a principal (called the government) who only cares about social welfare and an agent (called the bureaucrat) who only cares about his own income. This specific formulation we share with Laffont-Tirole (1993). The broader view that governments are neither purely welfare-minded nor completely indifferent to welfare we share with many others as well (see for example Breton (1974), Wilson (1989), Klitgaard (1991)).

There a number of different of alternative interpretations of who the social welfare-maximizing principal might be. One possibility is that she is a benevolent constitution-maker who sets up the rules that the bureaucrats are subject to. Alternately she may be a politician who cares about social welfare because she cares about being reelected[5]. Or she may be a senior bureaucrat who cares about social welfare because she fears becoming the scapegoat if the government does too poorly on social welfare. Or she could be someone in power

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[4] See Shleifer-Vishny (1994)

[5] See Olson (1965) on why the desire to get reelected does not necessarily lead governments to care about the welfare of the average person.

who genuinely cares about social welfare.[6]

Of course this conflict of objectives between the government and its agents will be irrelevant in settings where profit maximization leads to social welfare maximization. It is however clear that many of the things that governments do in fact take place in settings where profit maximization does not lead to efficiency. The standard examples of such activities are the provision of education and health, but, in the early years of development planning, similar market failure arguments were made to justify the licensing of industrial production, imports, exports and the access to scarce inputs.[7] In each of these instances there is more than one reason why there may be a market failure, but one of the most common and one of the most important is failures in the capital market. This is the source of market failure wc will emphasize here.

The specific problem which is modeled in this paper is the allocation of a set of slots among a larger set of applicants in the presence of capital market imperfections. This broadly fits each of the examples given above.

The basic question we ask using this model is why governments are more prone to bribery and red-tape than large private firms and, further, why some governments are more prone to these problems than others. Our answer, while admittedly partial. identifies two factors that are potentially important:

1. The lack of coherence in the governments objectives • which we model in

[6]While we have assumed that the principal cares only about social welfare, nothing important would change if the principal also put some weight on private gains.

[7]While this form of government intervention eventually proved to be a constraint on development and was probably based on an excessive mistrust of the price system, there is little reason to believe that the arguments in their favor were disingenuous. In other words, the eventual abandonment of these systems does not imply that the initial decision to adopt them was not ex ante social welfare maximizing, given the information and the understanding that the government then had.

terms of the conflict between the welfare-minded government and the greedy bureaucrat.

2. The fact that the government is most involved in the allocation process precisely in situations where the capital market is imperfect.

1.2 An Outline of the Formal Framework

Let the set of slots being allocated be of lebesgue measure 1 and the population of applicants to be of Lebesgue measure $N > 1$. We index the applicants by i and assume that i is uniformly distributed over the interval $[0,N]$.

The applicants may be of two types, which we will call low and high. The low type generates a return L if awarded the opportunity while the high type generates a return of H. We assume that these are both the social and private returns and that $L < H$. We assume that the fraction of type H applicants is $N_H < 1$ and that of type L is N_L.

As mentioned above, we will assume that the principal, whom we call the government, cares only about social welfare. More specifically, we will assume that the government wants to allocate the slots to maximize total social surplus (i.e. we ignore distributional goals).[8] The government would therefore like to give every high type agent a slot. However, there a number of reasons why it may not be able to achieve this outcome. First, we will assume that the government does not have the time to carry out the allocation on its own and therefore has to rely on a bureaucrat to do so. This bureaucrat, unlike the principal, cares only about his own income. Second. the bureaucrat cannot distinguish between the two types of applicants. Finally there is a capital

[8] The exclusion of distributive goals from the government's objectives is deliberate; allowing the government a more complex objective makes it easier to explain why it might generate inefficient outcomes . our present formulation therefore provides the sharpest test of our theory.

market imperfection. The applicants cannot necessarily pay as much as they want for the slots. We will model the capital market constraint as **an upper** bound, y, on each applicant's ability to pay. In this section and the next we will assume that y is the same for all applicants. This assumption will be relaxed later.

The class of mechanisms the bureaucrat can use to allocate the slots is going to be very important for the results: the mechanism we consider consists of two instruments - prices and red-tape.

Typically there will be a menu of prices with different probabilities of getting the slot associated with them. In the general model where the ability to pay varies and is observable, we may also need to allow the price to depend on the buyer's ability to pay.

Red-tape in our formulation takes the form of pure wasted time.[9] The cost of a unit of wasted time to an applicant is 6. These costs may be thought of as the losses in productivity from delays, time costs of waiting in lines or simply the emotional costs of being harassed. We will assume that this is a non-monetary cost in the sense that having to bear it does not reduce the applicant's ability to pay. This is more than we really need to assume - our results only require that the wasted time does not reduce the applicant's ability to pay one for one. In the latter version this assumption seems to be quite consistent with our suggested interpretations.[10] We will also assume that the cost per unit of time to the bureaucrat of delaying an applicant is

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[9] In the previous version of the paper we allowed the red-tape to be an instrument for information collection so that it actually served a social purpose. We found however that this just complicates the analysis without changing the results in any important way.

[10] **It may be objected that this assumption is inconsistent with the** interpretation of the costs as time costs. We feel that this is only true under a rather extreme view of how the labor market works.

ν, where ν is small relative to 6.

We also need to specify what the government can observe about the bureaucrats. We will assume that the government can observe the allocation the bureaucrat generates, albeit imperfectly, and can use the information to give incentives to the bureaucrat. Specifically we assume that for each L type applicant who is allocated a slot by the bureaucrat, the bureaucrat suffers a loss of F (the natural way to think of this is **that** <here is exogenous probability that the bureaucrat would get caught awarding slots to the low type and on being caught loses the job or goes to jail or loses face. F then is the expected value of this loss). Let F be chosen by the government. We also assume that the government can always control the number of slots that are allocated. This is made to avoid the possibility of an additional monopoly inefficiency which arises because the bureaucrat rations the good to raise its price. This is an additional complication that is unimportant to our basic line of argument and therefore, we feel, best avoided.

We do not however allow the government to observe the amount of red-tape that the **bureaucrat** generates. This assumption of total **unobservability** is convenient but can be dispensed with if we either put a bound the punishments or introduce risk-aversion. What we need for your results is that red-tape is less observable than the results generated by the bureaucrat. This assumption seems strong in **the** case we look at here because the red-tape is assumed to be pure waste. If, however, red-tape does have a some social function then it is easier to hide wasteful red-tape.[11]

Finally, till late in section 2.2 of the paper we will maintain the assumption that the government does not observe the payments made to the

[11] Say it is desirable that a bureaucrat reads all the forms carefully but not that he takes six months to do so.

bureaucrat by the applicants.

The sequencing of the actions is as follows. The government first chooses F. Then, given F, the bureaucrat chooses the mechanism for allocating the slots. The applicants make their choices taking the mechanism as given.

This completes the description of the model. To see what insights we can get from this kind of model, it is convenient to start with the case in which ***we only allow the bureaucrat to charge a price to those who receive the slot.***

To establish a benchmark let us first consider a situation whereeither the bureaucrat shares the government's objectives or, equivalently, the government can observe the ***amount*** of red-tape the bureaucrat generates. We will call this the benevolent government model. In this case, as long as y is not too low, the first best outcome in which all the high types get a slot and nobody suffers any red-tape, can be implemented by using a price mechanism; essentially all we have to do is offer the low type a sufficient discount on what the high ***type*** is paying and then the low type will be willing to accept the lower probability of getting the good. The only problem arises when y is very low; then it is impossible to give the low type a large enough discount (this is obvious when $y = 0$). We state the precise claim in:

Claim 1

Under the assumption that the government and the bureaucrat are both social welfare maximizers, the first best allocation can be achieved if and only if $y \geq L - L\cdot(1 - N_H)/N_L$, by offering a certainty of getting the good at a price $p_H = \min(y, H - (H - L)(1 - N_H)/N_L)$ to those who declare themselves to be the high type and a probability $(1 - N_H)/N_L$ of being able to buy the good at a price $p_L = \min(y, L - L(1 - N_H)/N_L)$ to those who claim to be low types.

We omit a formal proof of this proposition since it is simple extension of the verbal argument given in the text. Note however that what makes the argument work is the fact that the government does not care about making money from the allocative process and therefore, in the case where the allocation process is controlled by a bureaucrat who likes making money, such a mechanism would be unlikely to be used - the bureaucrat would raise the price to the low type.

Consider next the other extreme case - where both the government and the bureaucrat are interested only in making money. We call this the self-interested government model. Now the government does not care about the allocation and chooses $F = 0$. It is easy to see that then, as long as $y < L$, the bureaucrat maximizes his profits by simply setting a single price equal to y and then offering everybody an equal chance of buying the slot.[12] In other words, a purely self-serving government will also avoid red-tape.

Finally let us consider the intermediate case that we emphasize here in which there is a welfare-minded government and a money-minded bureaucrat. We call this the conflict of objectives model. Given our assumptions, the government can always induce the bureaucrat to choose to give a slot to each high type person - simply by setting F sufficiently high. However the bureaucrat will not want to use a mechanism of the type described in Claim 1 - he makes too little money on the low type. Rather he would want to set the price to both types equal to y (at least as long as $y < L$). However if both types are paying the same and those who declare themselves to be the high type are getting the slot for sure. everyone will claim to be the high type. To restore incentive compatibility,the bureaucrat will have to threaten anybody who claims to be a high type with enough red-tape i.e. the amount of red-tape,

[12]This has to be the optimum since everyone who getting the slot is paying y.

T_H will have to satisfy

$$L \cdot y \cdot \delta T_H = (L \cdot y)(1 \cdot N_H)/N_L \qquad \ldots[1]$$

This solution will be optimal for the bureaucrat as **long as red-tape does** not cost him too much i.e. ν is small relative to 6.

1.3 Overview of the Results

The first implication of the discussion above is that the case where **there is a conflict of objectives generates more red** tape **than either of the** cases in which both the government and the bureaucrat agree on the goal. The assumption that the government cares about social-welfare can explain why a government bureaucracy generates more red-tape than a private monopolist.

We also find that increasing F in this model increases red-tape. Therefore the **government** may want to provide only low-powered incentives to its bureaucrats. This can explain why we do not usually observe explicit high-powered incentives for bureaucrats.[13]

A final result follows from equation [1]. It is easily checked that T_H is decreasing in y. In other words, red tape will be highest where the access to capital is the worst. This may be a part of the explanation of the observed high correlation between low levels of development and poor governmental performance.[14]

The exposition above is misleading in one important way. Because we restrict **ourselves to** mechanisms in which the applicant only pays if he gets the slot, in the self-serving government model there is never any reason to use red-tape. This changes once we allow the bureaucrat a bigger class of mechanisms. The mechanism that maximizes the bureaucrats take when y is less

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[13] **For other explanations see Tirole (1392)**

[14] See Mauro (1993) for evidence of the existence of such a correlation.

than L is one which makes agents pay even if they do not get the slot . The reason is that when y is less than L, the amount the applicants are paying is less than the value of the good to them; therefore they will be willing to pay even if they are not sure of getting the slot.

This observation has two implications. First,it means that the bureaucrat may have the incentive to offer a higher share of the slots to the high type even if F is 0, simply in order to charge them a higher price. Second, and as a consequence of the first observation, the high type's incentive constraint will now bind for a range of values of y. Therefore, in principle the bureaucrat would want ta inflict red-tape on the low type in order to relax the high types incentive constraint. The main result in the next section demonstrates that this will never happen at the optimum and that there is always more red-tape in the conflicting objectives model than in either of the other models.

The plan of the paper is as follows: the next section presents the analysis of the model as well the basic results. The third section looks at a more general version of the model where we allow inequality in the abilities to pay. We conclude in section IV with some discussion of some deficiencies of our model.

II. ANALYSIS OF THE MODEL

2.1 Solving the Bureaucrat's Problem

The mechanism design problem faced by the bureaucrat is potentially quite complex; however in a previous versian of the paper ve show that the optimal mechanism always has a specific form[15] • it can be described by six numbers $\{p_H, p_L, \pi_H, \pi_L, T_H, T_L\}$ of which the first two represent the price charged to

[15] Proof available from author.

everyone who claims to be a high type or a low type, the second two are the probabilities that a person would get the slot conditional on the person's declared type and the last pair are the amounts of red-tape suffered once again conditional on the person's declared type.

We can use the fact that each and every slot has to be allocated to eliminate π_L and as result we can replace π_H by π. With this notation the bureaucrat's maximization problem [MB] can be written as:

Choose p_H, p_L, π, T_H, T_L to maximize

$$N_H p_H + N_L p_L - N_H \nu T_H - N_L \nu T_L - (1 - \pi N_H)F$$

subject to the constraints

$$H \cdot \pi - p_H - \delta T_H \geq H \cdot (1 - \pi N_H)/N_L - p_L - \delta T_L \qquad \text{...[ICH]}$$

$$L \cdot (1 - \pi N_H)/N_L - p_L - \delta T_L \geq L \cdot \pi - p_H - \delta T_H \qquad \text{...[ICL]}$$

$$H \cdot \pi - p_H - \delta T_H \geq 0 \qquad \text{...[IRH]}$$

$$L \cdot (1 - \pi N_H)/N_L - p_L - \delta T_L \geq 0 \qquad \text{...[IRL]}$$

$$0 \leq p_L \leq y,\ 0 \leq p_H \leq y,\ 0 \leq \pi \leq 1,\ T_H, T_L \geq 0.$$

It immediately follows from the specification of the problem that:

Lemma 1

At the optimum ICH and ICL cannot bind simultaneously and IRH never binds.

Proof: The first part is immediate from comparing the inequalities. The second part is obtained by comparing the observation

$$H \cdot \pi - p_H - \delta T_H \geq H \cdot (1 - \pi N_H)/N_L - p_L - \delta T_L$$

with the observation that

$$H \cdot (1 - \pi N_H)/N_L - p_L - \delta T_L > L \cdot (1 - \pi N_H)/N_L - p_L - \delta T_L \geq 0.$$

Proved

Using this result we can prove that:

Lemma 2

Self-declared low types are never subject to any red-tape i.e. there is always an optimum at which $T_L = 0$ and as long as $\nu > 0$, this is the only optimum.

Proof: Note that if ICH does not bind then the bureaucrat will always want the value of T_L to be lower. Therefore $T_L > 0$ implies that ICH binds which in turn implies that ICL does not bind so that $T_H = 0$.

Next observe that if IRL does not bind we must have $\pi = 1$ because, if not, it is always possible to raise π and relax all the binding constraints. **It is also easy to see that if IRL does not bind we must have** $p_L = y$ **since** otherwise it would be possible to raise p_L and relax all the binding constraints while making the bureaucrat better off.

Consider first the case where IRL does not bind so that $\pi = 1$ and $p_L = y$. Then $H\pi \cdot p_H = H \cdot p_H > H\cdot(1 \cdot N_H)/N_L \cdot y \cdot \delta T_L$ so that ICH does not bind. Next consider the case where IRL binds. For the reason given in the previous sentence we cannot have $\pi = 1$ and $p_L = y$. First consider the option $p_L < y$. Then an increase in p_L combined with a reduction in T_L keeping $p_L + \delta T_L$ constant. always improves the outcome. Next consider option $\pi < 1$. In this case increase π while reducing T_L keeping the IRL binding. Then $d\pi/dT_L$ will satisfy $(L\cdot N_H/N_L)d\pi/dT_L = - \delta$. Substituting this into the ICH constraint we find that the LHS goes up (because π goes up) and the LHS goes down. Therefore this change relaxes the ICH constraint and it is always optimal to make such a change. This proves the first part of our claim. The second part is follows from the fact that with $\nu > 0$ a reduction in T_H is strictly in the principal's interest.

Proved

This proposition is key to understanding our proposition about there being less red-tape under self-serving governments than in our conflicting objectives model. The self-serving government is essentially trying to auction off the slots; the only difference with the environment of the standard auction model is the cap on people's ability to pay. However as long as this cap is not too strict this model behaves much like the auction model and **therefore it is ICH that binds.** What this proposition shows is that while in principal red-tape could be used to relax the ICH it is actually never used because there are always more efficient ways of providing incentives to the high type (namely by raising the price paid by the low type and reducing the probability that a low type gets a slot). By contrast, as we will see, under the conflicting objectives model, it is the ICL which is more likely to bind and in this situation red-tape will typically be used to relax it.

This result and everything that follows from it depends crucially on the assumption that the cost of suffering red-tape is independent of one's **type**. If, instead, we assumed that there was a sufficiently large wedge between the cost to the high type and the cost to the low type, then the result could be reversed. We feel however that the case we look at is, at the very least, the obvious first cut at the problem.

We solve the bureaucrats maximization problem [MB] in a number of steps. The first step in solving the bureaucrat's maximization problem is to consider the more limited maximization problem where we drop the constraint ICL. This gives us the problem [**mb**]

Choose p_H, p_L, π, T_H, T_L to maximize

$$N_H p_H + N_L p_L - N_H \nu T_H - N_L \nu T_L - (1 - \pi N_H)F$$

subject to the constraints

$$H \cdot \pi - p_H - \delta T_H \geq H \cdot (1 - \pi N_H)/N_L - p_L - \delta T_L \qquad \text{...[ICH]}$$

$$H \cdot \pi - p_H - \delta T_H \geq 0 \qquad \text{...[IRH]}$$

$$L \cdot (1 - \pi N_H)/N_L - p_L - \delta T_L \geq 0 \qquad \text{...[IRL]}$$

$$0 \leq p_L \leq y, 0 \leq p_H \leq y, \ 0 \leq \pi \leq 1, \ T_H, \ T_L \geq 0.$$

The solution to this problem is given in Lemma Al in the appendix. The next step is to consider when ICL binds:

Lemma 3

ICL binds at the values of $p_{,}$, p_L, π, T_H and T_L which solve the [mb] iff

a) If $F \geq L$, and $y < L$.

and

b) If $F < L$ and $y < L \cdot [N_H + N_L]^{-1}$.

Proof

Immediate from substitution of the solution of [mb] given in Lemma Al (in the appendix) into ICL.

This proposition tells us that the low type,s incentive constraint is more likely to bind the higher is F and the lower is y. This should accord with the reader's intuition since, when F is 0 and y is very high, we are in the standard setting of auction theory and then it is the high type's incentive constraint that one worries about.

The next step is to note that since when ICL does not bind [MB] is the same as [mb], the solution to [MB] is just the solution to [mb] when conditions a) and b) do not hold. We state this as:

Claim 2

If $F \geq L$, and $y \geq L$ or if $F < L$ and $y \geq L \cdot [N_H + N_L]^{-1}$ the solution to [MB] is the same as the solution to [mb].

We postpone commenting on this result till the next section and attempt to solve the problem when ICL does bind. The first step is to note that in the case where $\nu = 0$ this turns out to be extremely simple. All we have to do is to set π, p_H and p_L at the values at which solve [mb] and set T_H to satisfy ICL. In other words we discourage those low types who falsely claim to be high types by making them go through red-tape. Since IRH never binds and ICH does not bind as long as ICL binds, raising T_H does not cause any other constraint to be violated. Also since ν is 0 this is costless for the bureaucrat. Therefore this is the solution to [MB].

If ν is positive the analysis less trivial. Now there is a trade-off between raising T_H to satisfy ICL and using other means to do so. However as long as ν is small these other ways will typically be less attractive to the bureaucrat so that the solution should remain unchanged.[16] This is what we find (we only describe the solution for values of y higher than $L(1-N_H)/N_L$ to prevent the statement from becoming too long • the full statement is given in the previous version of the paper).

Claim 3

Let $N_L/N_H > \nu/\delta$ and $\nu/\delta + N_H\nu/N_L\delta < 1$. Then the solution to [MB] for the parameter values $L(1-N_H)/N_L \leq y < L$ if $F \geq L$ and $L(1-N_H)/N_L \leq y \leq L\cdot[N_H + N_L]^{-1}$ if $F < L$ is as follows:

If $L > y \geq L\cdot[N_H + N_L]^{-1}$ and $L(1+\nu/\delta) \leq F$, the outcome is $\pi = 1$, and T_H set to solve the equation $L \bullet y \bullet \delta T_H = 0$.

If $L > y \geq L\cdot[N_H + N_L]^{-1}$, $L \leq F < L(1+\nu/\delta)$, the outcome is $A = y/L$ and $T_H = 0$.

If $L\cdot(1-N_H)/N_L \leq y < L\cdot[N_H + N_L]^{-1}$, $L(1+\nu/\delta) \leq F$, the outcome is $A = 1$ and T_H set to solve $L \bullet y \bullet \delta T_H = 0$.

If $L\cdot(1-N_H)/N_L \leq y$ c $L\cdot[N_H + N_L]^{-1}$, $L(1+\nu/\delta) > F \geq L(\nu/\delta + N_H\nu/N_L\delta)$, the outcome is π and T_H set to solve $\pi L \bullet y \bullet \delta T_H = 0$ and $L(1-N_H\pi)/N_L = y$.

If $L\cdot(1-N_H)/N_L \leq y$ C $L\cdot[N_H + N_L]^{-1}$, $F < L(\nu/\delta + N_H\nu/N_L\delta)$, the outcome is $\pi =$

[16] The only exception is the case where F is exactly 0, when the bureaucrat may also be indifferent between a number of different values of π. In Lemma Al we have assumed that in this case the bureaucrat chooses the highest value of π.and therefore a small cost of red-tape may make him jump to a lower value of A.

$(N_H + N_L)^{-1}$ **and** $T_H = 0$.

Proof:

In Appendix.

With Claims 2 and 3 we have essentially completely characterized what the bureaucrat would choose for all values of y not less than $L\cdot(1-N_H)/N_L$ under the plausible restriction that ν is small. In the next section we discuss what the results look like and what they mean. Before we come to those however, the next result – the last in this section – shows that if ν is sufficiently large and y is sufficiently large it is always possible to implement the first best outcome $\pi = 1$, $T_H = 0$.

Claim 4

If $y \geq L - L\cdot(1-N_H)/N_L$, $N_L/N_H \leq \nu/\delta$ and $(N_H+N_L)L/N_H \leq F$, the outcome is $\pi = 1$ and $T_H = 0$.

Proof:

In Appendix.

2.2 Interpretation of the Results

The basic pattern revealed by these results is summarized in figures 1 and 2. In these figures we graph π and T as a function of y for the case in which ν/δ is very small (so that Claim 3 applies) and $y \geq L(1-N_H)/N_L$. In figure 1 (where we graph π) there are four curves corresponding to the four cases

i) $F \leq L(\nu/\delta + N_H\nu/N_L\delta)$

ii) $L > F \geq L(\nu/\delta + N_H\nu/N_L\delta)$

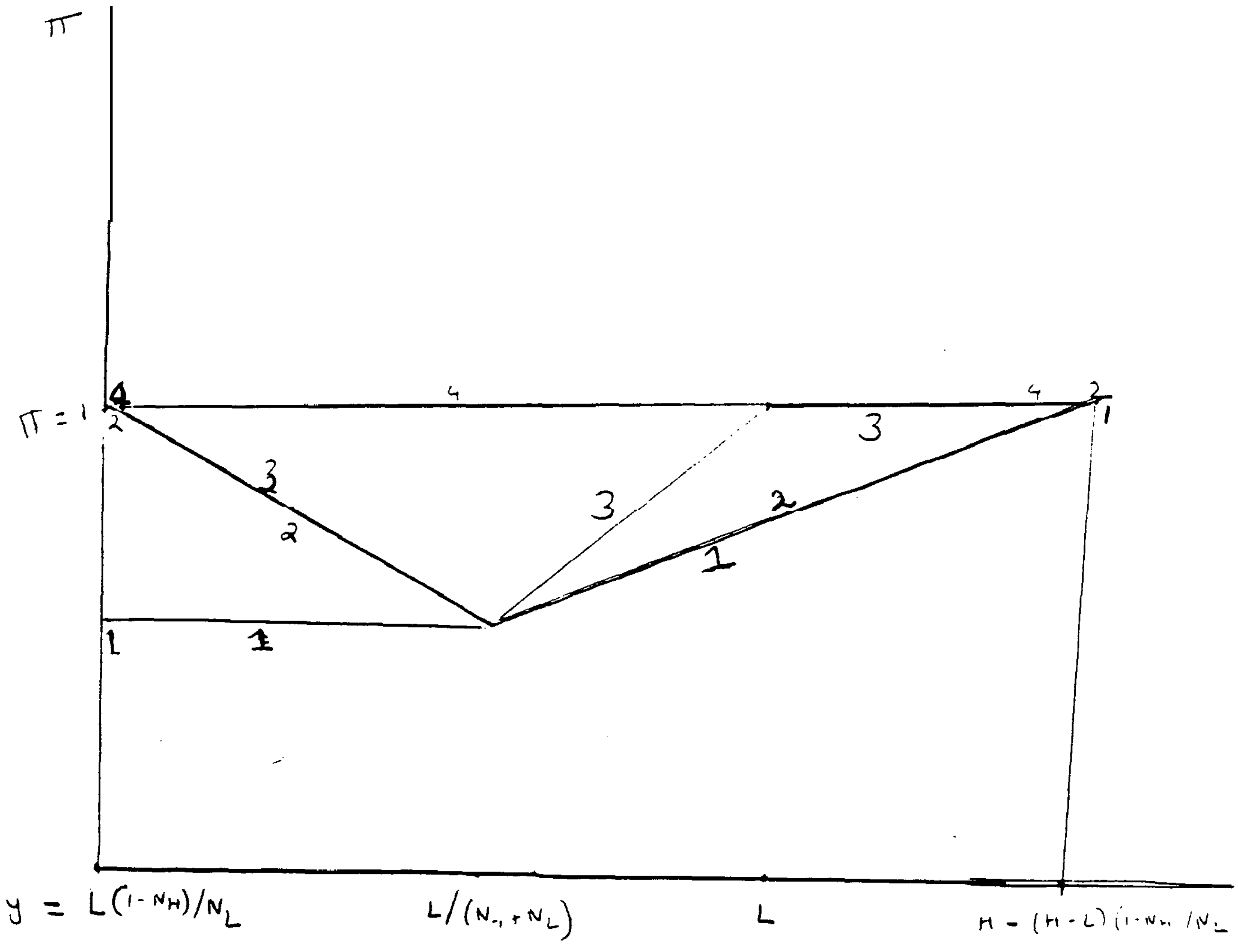
iii) $L(1 + N/6) > F \geq L$

iv) $F \geq L(1+\nu/\delta)$.

In figure 2 (where we graph T_H) there are three curves – the two cases we call

FIGURE 1

Π as a function of y



Curve 1 $\quad F < L(\nu/\delta + N_H\nu/N_L\delta)$

Curve 2: $\quad L(\nu/\delta + N_H\nu/N_L\delta) \leq F < L$

Curve 3: $\quad L \leq F < L(1+\nu/\delta)$

Curve 4: $\quad L(1+\nu/\delta) \leq F$

ii) and iii) coincide for T_H.

For a fixed value of y an increase in F increases π and T_H. The first of these result should not surprise anyone - an increase in F is effectively an increase in the reward to choosing a high Π. The second result is a direct consequence of the first - a higher A makes it more attractive for a low type to claim to be a high type. Therefore a higher level of red-tape has to be imposed on the high type to discourage low types from making such claims. Combined with the result (discussed above) that T_L is always 0, this says that the social waste due to red-tape is higher when F is high. Since a high value of F will only be chosen by a government which values social welfare, this says that there will be more red-tape when the government is more social welfare oriented. Red-tape will be minimized when the government chooses F = 0, which is the case of the government as a private monopolist.

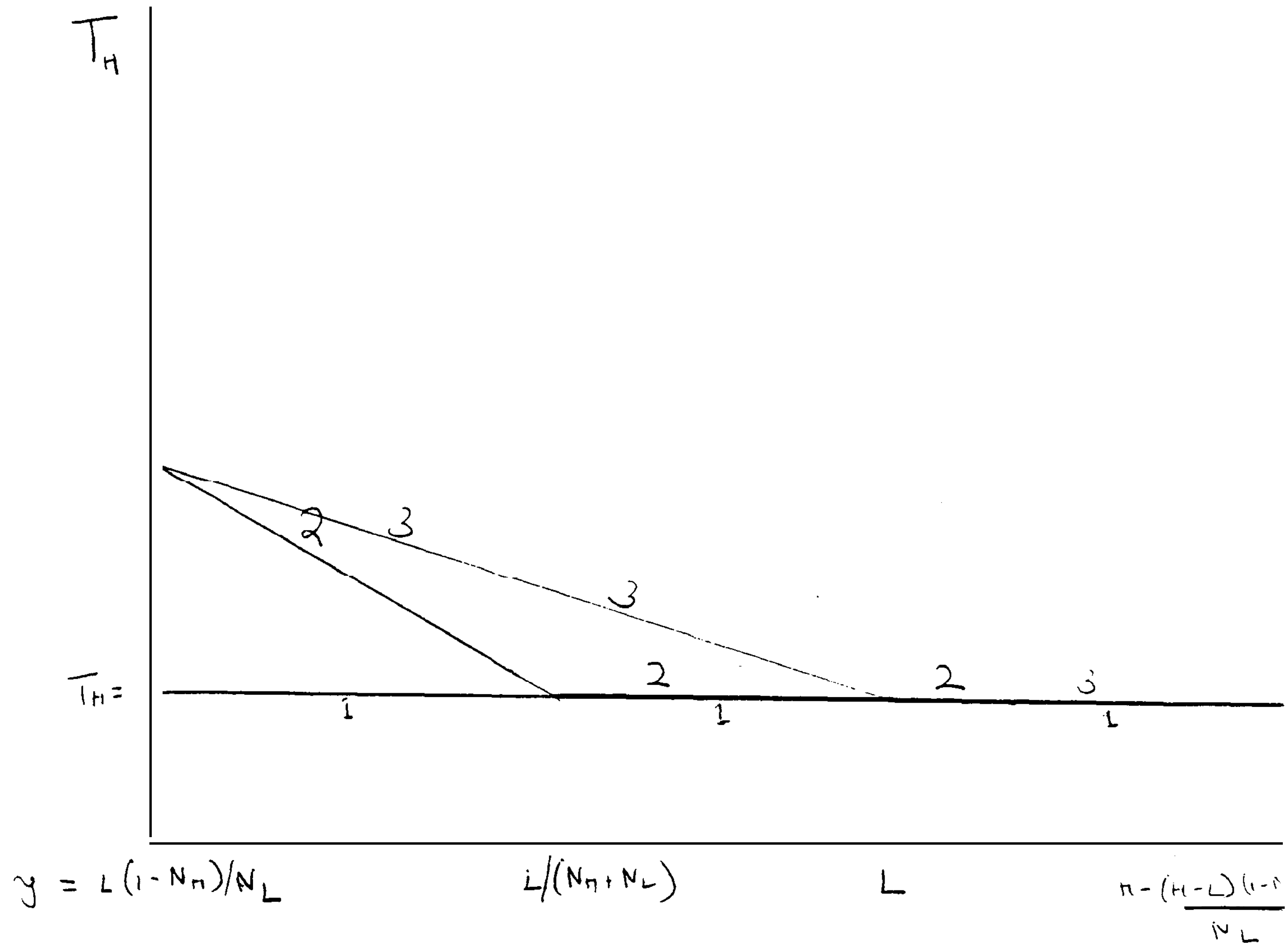
Of course, this assumes that the government's bureaucrats are not social welfare oriented and cannot be directly controlled by the government: we already know from Claim 1 that when the bureaucrats are welfare-minded or when the government can control the bureaucrats perfectly the outcome is first best. The amount of red-tape in our conflicting objectives model is therefore larger than the amount that will be generated either when the bureaucrat and the government are both self-serving or when they are both benevolent.

The fact that increasing F increases T_H also means that governments may not want give their bureaucrats high-powered incentives - making the incentives more high-powered might costs too much in terms of increased red-tape.

In each curve in figure 2, for a fixed value of F, T (weakly) increases as y falls. This result has a simple explanation. For high values of y it is possible to charge the high type applicant a very high price in return for the

FIGURE 2

T_H as a function of y



Curve 1: $F < L(\nu/\delta + N_H \nu / N_L \delta)$

Curve 2: $L(\nu/\delta + N_H \nu / N_L \delta) \leq F < L(1 + \nu/\delta)$

Curve 3: $L(1 + \nu/\delta) \leq F$

high value of π. This discourages the low types from pretending to be the high type. For lower values of y, however, it is not possible to charge the high types a high enough price. Therefore the low types will be more tempted to claim that they are the high type. To discourage them more red-tape will have to be inflicted on the high types.

This says that economies where the average person has less access to capital will tend to have more red-tape. Since poorer countries tend to have more inequality and worse capital markets this may provide a partial explanation of why government performance tends to be worse in poorer countries.

The behavior of π as a function of y can be read off from figure 1. Except when F is very high (when $\pi = 1$ at all values of y in our range) or very low (when π is constant at low levels of y), π is always U-shaped as a function of y; it is high at for high values of y as well as low values of y and is lower in between. When y is high the intuition is the standard intuition from price theory - the high types value the good more and therefore it pays more to give it to them as long as they can'register their preferences as higher prices. When y is low the reason why the final allocation is very efficient is because it is essentially costless for the bureaucrat to sort the applicants by using red-tape.

If we think of low levels of y as representing poorer countries, this seems counterfactual since it implies that the efficiency of governmental allocations is better in low income countries than in some higher income countries. One way out is to argue that the range where π increases with y is the only empirically relevant range. However this seems less than satisfactory and suggests that we are leaving out something important.

The possibility result Claim 4 seems rather uninteresting since ν is typically not a choice variable and the natural assumption about it is that it is small relative to 6 so that we are outside the domain of Claim 4. However we will now argue that if we extend our basic model to allow the government to observe payments made to bureaucrats by applicants there will be an indirect way in which the government can influence ν and therefore this Claim becomes relevant.

2.3 Controls on Payments to Bureaucrats and Bribery

Let us now allow the government to sometimes be able to observe payments that are being made to bureaucrats. Specifically assume that the probability that the government finds out how much money the bureaucrat is making by selling the slots is proportional to the amount of money the bureaucrat takes from an applicant (but the government does not find out how much the bureaucrat is taking). On being found out the bureaucrat pays a fixed penalty.

It should be easy to see that this is like putting a specific proportional tax on bureaucratic incomes. This indirect method for imposing a tax may be easier than directly imposing the same prapartinnnl tax because the bureaucrat's incomes may be hard to determine. Notice however that,in principle, there is no reason why we should not be able to use a direct mechanism here; the government would then ask the applicant for his type, ask the bureaucrat to do the testing, get the test score from the bureaucrat and allocate slots and make transfers accordingly (including any taxes that it may want to levy). Given this observation it is difficult to explain why we so often observe legal restrictions on bureaucrats accepting money from their clients and why those who do accept money are treated as criminals. We will not attempt to answer this question here[17], we will assume that for some exogenous reason the government imposes this tax on the bureaucrats in the form of a prohibition of bribe-taking (defined as money paid by the applicants to the bureaucrat) combined with a penalty on those who are caught taking bribes.

What will be the effect of such a tax on the bureaucrat's incentives? It should be fairly easy to see that the effect of b% tax on the bureaucrat's earnings is exactly like the effects of an increase in F and ν by a factor of $(1-b)^{-1}$. In other words, putting a penalty on bribe-taking is a way of increasing F and ν and if the penalty is large enough we will indeed be in the domain of Claim 4 and the first best will be achieved. In other words, *making payments to bureaucrats illegal and forcing them to take bribes may be a way of* simultaneously *increasing efficiency and reducing red-tape.*[18]

Now, of course, enforcing this kind of very harsh control on bribe-taking is very costly. If one just wanted to raise the effective value of F in order to raise π one might think that directly raising F may be at least as efficient than trying to control bribe-taking. Therefore it seems reasonable to conclude that such controls on payments are most likely to be used when, absent such controls, there is a natural tendency to have a high level of red-tape i.e. when y is relatively small.

Therefore for values of y which are low but not too low, we will observe high levels of red-tape, low levels of allocative efficiency and high levels of bribe-taking at same time. This provides a possible explanation of the

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[17] See Tirole (1992) and Kofman-Lawaree (1990) for some tentative answers to this puzzle.

[18] Note that here the government is essentially choosing to have bribery in order to reduce red-tape and promote efficiency. This contrasts with the common view that bribery is something that arises by default when the government sets up allocative procedures which are inefficient.

observation that all the measures of misgovernance - bribery, red-tape and allocational inefficiency - move together.

III IMPLICATIONS OF INEQUALITY IN THE ABILITY TO PAY

We have so far ignored igonred the possibility that different people may have different abilities to pay. This is an important deficiency since a standard justification of red-tape like procedures is that they can serve a screening function[19]. We will argue in this section that while the presence of inequality does increase the amount of red-tape used both in the private monopolist (or self-serving government) model and in our conflicting objectives model, it remains true that more red-tape is used in the latter case.

There are at least two ways to introduce inequality into this model. The simpler case is where both the bureaucrat and the government can observe each applicant's ability to pay. In this case the government sets an F which depends on the applicant's ability to pay and the bureaucrat chooses a different mechanism depending on the applicant's ability to pay. The bureaucrat's problem then consists of a number of parallel problems of the type we solve in the previous section. It is easy to see that the outcome of the bureaucrat's maximization problem will be such that those who have less money (smaller y) will face more red-tape.

This conclusion gets reinforced if we assume that neither the government nor the bureaucrat can observe the applicant's ability to pay. To see what happens in this case make the simplifying assumption we made in the introduction, namely that the bureaucrat confines himself to mechanisms where

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[19] See for example Weitzman (1977).

only those who get the slot pay a price. Also assume that $\nu = 0$ and that the ability to pay takes two values, y_1 and y_2 $(y_1 > y_2)$ with probabilities μ and $1 - \mu$ and that a person's valuation of the slot is statistically independent of his ability to pay. Finally to make the problem interesting assume that $1 > \mu(N_H + N_L)$ i.e there are not enough rich people to fill up the slots(if we don't make this assumption the poorer people may be irrelevant). In all other respects let the model be exactly the same as the model we introduce in section I.

Note first that as long as $y_2 \geq L - L\cdot(1 - N_H)/N_L$, Claim 1 automatically extends to this environment as well i.e. a benevolent government can implement the first best. The problem faced by a purely self-serving government in this environment also has a simple solution - the bureaucrat will set two prices, y_1 and y_2, and offer a slot to each person who pays the higher price and randomly select $1 - \mu(N_H + N_L)$ persons among those who offer to pay the lower price. This will be incentive compatible if[20].

$$L - y_1 \geq L[(1 - \mu(N_H + N_L))/(N_H + N_L)] - y_2 \qquad \ldots[2]$$

If not, the bureaucrat will have to threaten those who pay less with some red-tape; the exact amount of red tape, T, will be given by:

$$L - y_1 = L[(1 - \mu(N_H + N_L))/(N_H + N_L)] - y_2 - \delta T \qquad \ldots[3]$$

In the conflicting objectives model, if the government sets a high enough F, the bureaucrat will want to give a slot to every high type. The mechanism that maximizes the bureaucrat's profits conditional on giving a slot to every high type, will be described by four triplets. $(y_1, T_1, 1)$, $(y_2, T_2, 1)$, $(y_1, T_1, (1 - N_H)/\mu N_L)$, $(y_2, T_2, (1 - N_H - \mu N_L)/(1-\mu)N_L)$ satisfying:

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[20] It is easily checked that this is the incentive constraint that may bind.

$$L \cdot y_1 \cdot \delta T_1 = \min((1 - N_H)/\mu N_L,\ 1)(L \cdot y_1) \qquad \ldots[4]$$

$$L \cdot y_2 \cdot \delta T_2 = \max(0,\ (1 \cdot N_H \cdot \mu N_L)/(1-\mu)N_L)(L \cdot y_2) \qquad \ldots[5]$$

The first number of each of these triplets is the price that a person who chooses that option pays. The second number is the amount of red-tape he has to go through. The last is the probability that he gets the slot. The first two options are chosen by the two kinds of high types (rich and poor) and the last two options are chosen by the low types. The way we have chosen T_1 and T_2 makes sure that low type people, both rich and poor, self-select to the options chosen for them. The outcome generated by this mechanism is that the rich high types choose the first option and the poor high types choose the second option. If the number of remaining slots is less than the number of rich low types we assume that only rich low types apply and that they apply for option 1. If there slots left over after all the rich low types have chosen, then they will be given to some of the poor low types.

This analysis, while quite rudimentary, yields a number of useful insights:

1. A comparison of equations [4] and [5] with equation [3] establishes that while in the presence of inequality red-tape will arise in both the self-serving government model and the conflicting objectives model, there will always be more red-tape generated under the latter model. This confirms the result in the previous section.

2. It is evident from equations [4] and [5] that an increase in inequality in the distribution of the abilities to pay (keeping the mean ability to pay constant) reduces T_1 and increases T_2. In the Appendix we show that on balance the total social waste due to red-tape goes up unambiguously (see Claim 5). The reason is that the probability that a poor low type gets a slot is lower than the same probability for a rich low type and therefore a reduction in y

for the poor low type increases T_2 by more than the matching increase in the rich low type's y reduces T_1.

3. The poor face more red-tape than the rich in the conflicting objectives model. The same result may also be true in the pure self-serving government model but only if y_2 is sufficiently low. In both cases the bureaucrat uses this extra red-tape to threaten the rich with, so that the rich are forced to buy their way out of it.

4. The poor of the low type get less access to the slots than the rich of the low type both under the conflicting objectives model and the pure self-serving government model, though the difference in access is greater in latter case.

IV. CONCLUSIONS

The model proposed in this paper, while both simple and stylized, makes a number of predictions that broadly fit the pattern of what we know abut misgovernance. It does however have a number of features that are less than attractive. Foremost among these is the prediction that allocative efficiency of public allocations may get worse as we move from very poor countries to less poor ones. Also the only reason the paper gives for why there should be more bribery in poor countries is that in rich countries it is less costly not **to try to control the amounts of money the bureaucrats collect.** Now it is true that in some cases governments in developed countries do use the market rather more than in LDCs.[21] But there are also important areas such as health-care where most developed countries do not use the market and yet there is very little actual bribery. **We also cannot explain why some developed and rich**

[21] Few rich countries have licenses for production and imports and in the U.S.) for example oil drilling rights are auctioned off too.

countries like Italy and Japan have so much more bribery than others.

This suggests that there are several important pieces missing from the story we tell here. First, we have assumed rational behavior on the part of the government. While this does not rule out mistakes (after all private agents make mistakes too) there are many anecdotes suggesting that governments make many mistakes which no private organization would get away with (such as the Big Leap Forward in China). While one cannot rule cut the possibility that this is because the government must do more things and more complex things than private organizations, in some cases the errors reveal a callousness (or optimism) that seems hard to explain away without introducing a role for ideology.

Second, we have left out the whole issue of whether there are cultural or institutional determinants of government performance. One stereotype we did not take up (because it concerns preferences rather than outcomes) is the characterization of third world societies as being much more casual about corruption in government than first-world governments. It has been pointed out that in this instance what appears to be cultural and exogenous may be endogenous and rational in the sense that there may be multiple equilibria in some of which corruption may be rare and heavily punished and others in which corruption is common end tolerated.[22]

Of course, even if we accept the multiple equilibrium view it remains to explain why the culture of corruption should emerge principally in LDCs.[23] Two

[22] See Tirole (1992), Lui (1986), Cadot (1987), Clague (1993) Sah (1991) for different arguments within this broad category. Also see Acemoglu (1992) and Murphy, Shleifer and Vishny (1993) for the related argument that the presence of corruption may actually induce others to become corrupt by reducing the return to the honest activity.

[23] Italy being a well-known exception.

explanations come to mind - one could argue that the culture of corruption is what causes LDCs to be less developed. This we find somewhat implausible given that these LDCs also tended to be poor countries before the recent era of large-scale government interventions in the economy. The other, more convincing (to us) theory holds, that development is a process of transforming a large complex of institutions along with increasing the G.N.P. The culture of corruption in poor countries is at least partly a result of underdeveloped institutions (like a lack of democracy).

APPENDIX

Lemma A1

The solution to the problem [mb] given above is given below:

If $F \geq L$ and $y \geq H - (H - L)\cdot(1 - N_H)/N_L$, $\pi = 1$, $p_H = H - (H - L)\cdot(1 - N_H)/N_L$, $p_L = L(1 - N_H)/N_L$ and $T_H = T_L = 0$.

If $F \geq L$ and $H - (H - L)\cdot(1 - N_H)/N_L > y > L(1 - N_H)/N_L$, $\pi = 1$, $p_H = y$, $p_L = L(1 - N_H)/N_L$ and $T_H = T_L = 0$.

If $F \geq L$ and $y \leq L(1 - N_H)/N_L$, $\pi = 1$, $p_H = y$, $p_L = y$ and $T_H = T_L = 0$.

If $F < L$ and $y \geq H - (H - L)\cdot(1 - N_H)/N$, $\pi = 1$, $p_H = H - (H - L)\cdot(1 - N_H)/N_L$, $p_L = L(1 - N_H)/N_L$ and $T_H = T_L = 0$.

If $F < L$ and $H - (H - L)\cdot(1 - N_H)/N_L > y \geq L/(N_H+N_L)$, $\pi = [N_L y + (H-L)]/[HN_L + (H-L)N_H]$, $p_H = y$, $p_L = L(H - N_H y)/[HN_L + (H-L)N_H]$ and $T_H = T_L = 0$.

If $F < L$ and $L/(N_H+N_L) > y \geq L(1 - N_H)/N_L$, $\pi = (1 - N_L y/L)/N_H$, $p_H = y$, $p_L = y$ and $T_H = T_L = 0$.

If $F < L$ and $y < (1 - N_H)/N_L$, $\pi = 1$, $p_H = y$, $p_L = y$ and $T_H = T_L = 0$.

Proof of Lemma A1

Observe that at the optimum either the IRL constraint binds or $p_L = y$ (otherwise the bureaucrat would raise p_L). Consider first the case where the IRL constraint binds at the optimum. Assume to start out that the ICH constraint does not bind. Then p_H must be equal to y. What remains to be determined is the value of π. If ICH is not binding, a reduction in π has two effects; it increases $p_L N_L$ by $L\cdot N_H$ and it increases the expected punishment term by $F.N_H$. Therefore if $L \leq F$, π will be set equal to 1. If $L > F$, π will be reduced till either ICH binds or IRL stops binding so that it ceases to be profitable to reduce π.

This leaves us with four distinct cases we need to consider:

i) $F \geq L$ and IRL binds
ii) $F \geq L$ and IRL does not bind
iii) $F < L$ and IRL binds
iv) $F < L$ and IRL does not bind

Consider the first two cases together. We know from above that if $F > L$ and IRL binds, π will be set equal to 1; a fortiori this will also be true if IRL does not bind. Then if IRL were to bind, p_L would be $L(1-N_H)/N_L$. Therefore IRL binds if and only if $L(1-N_H)/N_L \leq y$.

Let IRL bind; then from ICH, $H - p_H \geq (H - L)\cdot(1 - N_H)/N_L$ which implies $p_H \leq H - (H - L)\cdot(1 - N_H)/N_L$. Now either this is an equality or $p_H = y$. Which happens depends on whether how y compares with $H - (H - L)\cdot(1 - \pi N_H)/N_L$; p_H will be the smaller of the two.

If IRL does not bind then $p_L = y$. Then ICH cannot bind either since $H(1-N_H)/N_L - y < H - p,$. Therefore $p_H = y$.

Turning now to the case where F $<$ L and both ICH and IRL bind, we substitute IRL in ICH to get:

$$H\cdot\pi - p_H = (H - L)\cdot(1 - \pi N_H)/N_L \qquad \text{...[A1]}$$

If we increase p_H towards y, π has to go up. The rate at which it **goes up**, $d\pi/dp_H$, is $1/[H+ (H - L)N_H/N_L]$. The resulting reduction in p_L will be $L\cdot(N_H/N_L)\cdot[H + (H - L)N_H/N_L]^{-1}$. Therefore there will be a net gain from the increase in p_H if $N_H > N_L\cdot L\cdot(N_H/N_L)\cdot[H + (H - L)N_H/N_L]^{-1}$ which is always true. So, the outcome in this case is either $p_H = y$ or $\pi = 1$.

Which of these two outcomes obtains at the optimum depends on which binds first as we increase p_H towards y. It can be checked by looking at [AI] that if y is greater than $H - (H - L)\cdot(1 - N_H)/N_L$ then π will hit 1 before p_H hits y. Therefore this will be the outcome. If, however, y is below this critical level then p_H will hit y with A less than 1.

Of course these predictions assume that the IRL constraint binds rather than the alternative outcome $p_L = y$. Now as long as y is greater than L we cannot have $p_L = y$ since this would violate IRL. Therefore the IRL constraint must bind if y is higher than L. By continuity it will also continue to bind when y is lower than L but not too low. However as we continue to reduce y, π will fall towards $(1-\pi N_H)/N_L$ and p_L will rise to close the gap with p,. This cannot go on indefinitely; y must ultimately reach another critical value; at this value of y, π must be equal to $(1-\pi N_H)/N_L$ and both p_H and p_L must be equal to y and any further reduction in y will make p_L **greater** than y. A simple calculation establishes that the critical value of y must be $L/(N_H + N_L)$ and A must be $1/(N_H + N_L)$.

Once y falls below $L/(N_H + N_L)$, the constraint $p_L \leq y$ will bind and therefore there is nothing to be gained by further lowering π. It is easily checked then it is/optimal to set $p_L = p_H = y$ and to raise π to meet the IRL constraint (since $\pi > 1/(N_H + N_L)$ and $p_L = p_H$, ICH cannot bind).

The value of π as a function of y in this region of the parameter space will be (from IRL) $\pi = (L - N_L y)/N_H L$. Now as y goes to 0 this value of π goes to a number greater than 1. Therefore y must hit a critical value beyond which reducing y does not increase π. This value of y is $L(1-N_H)/N_L$. Below this value of y, $\pi = 1$.

Compiling all the results proved above we have the claimed result.

Proved

Proof of Claim 3

Note that since ICH does not bind raising p_H is always a good thing. Therefore $p_H = y$. Assume now that $T_H > 0$ and consider the effect of a ΔT_H reduction in T_H on the bureaucrat's objective function. To keep ICL satisfied we must either reduce p_L or reduce π. In the case when we reduce p_L the gain' is $\nu N_H \Delta T_H$ which is less than the loss which is $N_L \delta \Delta T_H$ by our condition $\nu/\delta < N_L/N_L$. Therefore it will never pay to reduce p_L. In fact p_L will be raised till either IRL binds or $p_L = y$.

Assume next that IRL binds. This combined with ICL implies that

$$\pi L - y - \delta T_H = 0 \qquad [A2]$$

From [A2] $d\pi/dT_H = 6/L$. Using this in combination with the formula for $dp_L/d\pi$ derived from IRL, we find that an increase in T_H (weakly) increases the bureaucrat's welfare if $F \geq (1+\nu/\delta)L$. Thcrcforc if $F \geq (1+\nu/\delta)L$, an increase in A accompanied with the corresponding rise in T_H must increase the bureaucrat's welfare. Conversely, as long as $p_L < y$, if $F < (1+\nu/\delta)L$ a reduction in T_H must raise the bureaucrat's welfare.

Next let IRL not bind. Then from ICH, $dT_H/d\pi = L(1+N_H/N_L)/\delta$. Therefore an increase in π accompanied by a rise in T_H (weakly) raises the bureaucrat's welfare iff $F \geq L(\nu/\delta + \nu N_H/N_L\delta)$.

Since $L(\nu/\delta + \nu N_H/N_L\delta) < L(\nu/\delta + 1)$, $F \geq L(\nu/\delta + 1)$ suffices in both cases. Therefore under this condition π will be set equal to 1 (since an increase in π accompanied by an increase in T_H increases the bureaucrat's welfare). Therefore $p_L = \min\{(1-N_H)/N_L, y\}$ which, given our restriction on y, means that $p_L = (1-N_H)/N_L$.

Next consider the case where $L(\nu/\delta + \nu N_H/N_L\delta) \leq F < L(\nu/\delta + 1)$. In this case it does not pay to increase π once IRL binds but as long as IRL does not bind, A will be increased. Therefore either $\pi = 1$ or A must be such that IRL just binds. But if IRL does not bind, we must have $p_L = y$ which along with $\pi = 1$ implies that IRL is violated (as long as $y \geq$ (l-NJ/N,). Therefore IRL must bind i.e. we must have $L(1-N_H\pi)/N_L = p_L$.

Now we know from above that when IRL binds and $p_L < y$, if $F < (1+\nu/\delta)L$ the bureaucrat always wants to reduce T_H. Therefore at the optimum we will have $T_H = 0$. this implies that the optimal values of π and p_L will be, **repectively,** y/L and $L(1-N_H y/L)/N_L$.

By contrast, when $y < L/(N_H + N_L)$, solving IRL and ICL with $T_H = 0$ yields a solution for p_L which is greater than y. Therefore we must choose $T_H > 0$. Specifically we will choose $p_L = y$ and π and T_H to satisfy $\pi L - y - \delta T_H = 0$ and

$L(1-N_H\pi)/N_L = y.$

Proved

Proof of Claim 4:

As long as $y \geq L$, we can make use of Claim 2 and Lemma Al to characterize the solution and it indeed turns out to be as described. However since $F > L$. once $y < L$, ICL binds and we are outside the domain of Claim 2.

Next recall from the proof of Claim 3 that if $\nu/\delta > N_L/N_H$ a reduction in T_H combined with a reduction in p_L which keeps ICL exactly binding will increase the bureaucrat's welfare. So either p_L or $T_H = 0$ at the optimum. But if $p_L = 0$, $T_H > 0$ the ICL constraint takes the form

$$\pi L - y - \delta T_H \leq L(1-\pi N_H)/N_L$$

...[A3]

or

$$L[\pi - (1-\pi N_H)/N_L] \leq y + \delta T_H \qquad \text{...[A4]}$$

The left-hand side of this inequality is maximized when $\pi = 1$. It then takes the value $L - L(1-N_H)/N_L$. Now since we have assumed that y is always greater than this value, the right-hand side is always at least as big as the left-hand side even if $T_H = 0$. But then there is no reason to set $T_H > 0$. This contradiction establishes that we must have $T_H = 0$ at the optimum.

To show that $\pi = 1$ differentiate the equation corresponding to the ICL constraint to get

$$dp_L/d\pi = - L[1 + N_H/N_L] \qquad \text{...[A5]}$$

Using this it is easy to show that the derivative of the bureaucrat's objective function with respect to π is

$$- (N_H + N_L)L + N_H F \qquad \text{...[A6]}$$

By our assumption above this is positive. Therefore $\pi = 1$ is optimal

Proved

Claim 5

An increase in y_1 keeping $\mu y_1 + (1 - \mu)y_2$ fixed, increases the social waste due to red tape.

Proof:

Consider the case where $1 - N_H - \mu N_L > 0$. The other case is very similar. In this case $d\delta T_1/dy_1 = 0$ and $d\delta T_2/dy_2 > 0$. The result follows immediately.

Proved

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